Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Joint Training Camp (JTC) and vicinity, Jordan
Calendar Years: (2011 to 2015)

AUTHORITY: This POEMS has been developed in accordance with Department of Defense Instructions (DoDI) 6490.03, 6055.05, and Joint Chiefs of Staff memorandum MCM 0017-12 (References 1-3).

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of occupational and environmental health (OEH) risk for JTC and vicinity. It presents a qualitative summary of OEH risks identified at JTC and vicinity and their potential medical implications. The report is based on information collected from 7 April 2011 through 31 December 2015 to include deployment OEH surveillance sampling and monitoring data (e.g., air, water, and soil), field investigation and health assessment reports, as well as country and area-specific information on endemic diseases.

This assessment assumes that environmental sampling at JTC and vicinity during this period was performed at representative exposure points selected to characterize health risks at the population–level. Due to the nature of environmental sampling, the data upon which this report is based may not be fully representative of all the fluctuations in environmental quality or capture unique occurrences. While one might expect health risks pertaining to historic or future conditions at this site to be similar to those described in this report, the health risk assessment is limited to 7 April 2011 through 31 December 2015.

The POEMS can be useful to inform healthcare providers and others of environmental conditions experienced by individuals deployed to JTC and vicinity during the period of this assessment. However, it does not represent an individual exposure profile. Individual exposures depend on many variables such as; how long, how often, where and what someone is doing while working and/or spending time outside. Individual outdoor activities and associated routes of exposure are extremely variable and cannot be identified from or during environmental sampling. Individuals who sought medical treatment related to OEH exposures while deployed should have exposure/treatment noted in their medical records on a Standard Form (SF) 600 (Chronological Record of Medical Care).

SITE DESCRIPTION:

The JTC is a joint Jordanian-American military training center in Zarqa, Jordan. The JTC is a contingency base in Zarqa, Jordan, occupied by elements of the Jordanian Armed Forces and Allied partners. The JTC facilities include training ranges, troop housing, dining facilities, and additional life-support facilities. The U.S.-occupied compound of JTC is primarily used to support the training of Jordanian Armed Forces personnel. Additional U.S. military and U.S. Federal agencies use JTC facilities in support of contingency operations in the U.S. Central Command (CENTCOM) area of responsibility.

SUMMARY: Conditions that may pose a Moderate or greater health risk are summarized in Table 1. Table 2 provides population based risk estimates for identified OEH conditions at JTC and vicinity. As indicated in the detailed sections that follow Table 2, controls established to reduce health risk were factored into this assessment. In some cases, e.g., ambient air, specific controls are noted, but not routinely available/feasible.

Table 1: Summary of Occupational and Environmental Conditions with MODERATE or Greater Health Risk

Short-term health risks & medical implications:

The following hazards may be associated with potential acute health effects in some personnel during deployment at JTC and vicinity:

Food/waterborne diseases (e.g., bacterial diarrhea, typhoid/paratyphoid fever, diarrhea-protozoal); other endemic diseases (cutaneous leishmaniasis (acute), rickettsioses tickborne [spotted fever group], West Nile fever, and sandfly fever, leptospirosis, schistosomiasis, Q fever); and heat stress. For food/waterborne diseases (e.g., bacterial diarrhea, typhoid/paratyphoid fever, diarrhea-protozoal), if ingesting local food and water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (typhoid/paratyphoid fever). Risks from food/waterborne diseases may have been reduced with preventive medicine controls and mitigation, which includes hepatitis A and typhoid fever vaccinations and only drinking from approved water sources in accordance with standing CENTCOM policy. For other vector-borne endemic diseases (cutaneous leishmaniasis (acute), rickettsioses tickborne [spotted fever group], West Nile fever, and sandfly fever), these diseases may constitute a significant risk due to exposure to biting vectors; risk reduced to 'Low' by proper wear of the treated uniform, application of repellent to exposed skin, bed net use, and appropriate chemoprophylaxis, as well as minimizing areas of standing water and other vector-breeding areas. For water contact diseases (leptospirosis and schistosomiasis) activities involving extensive contact with surface water increase risk. For respiratory diseases (tuberculosis), personnel in close-quarter conditions could have been at risk for person-to-person spread. Animal contact diseases (Q fever), pose year-round risk. For heat stress, risk can be greater during months of April through October, and greater for susceptible persons including those older than 45, of low fitness level, unacclimatized, or with underlying medical conditions, and those under operational constraints (equipment, personal protective equipment [PPE], vehicles). Risks from heat stress may have been reduced with preventive medicine controls, work-rest cycles, proper hydration and nutrition, and mitigation.

Air quality: For inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}) from environmental dust (including burn pits), the PM_{10} overall short-term health risk was not evaluated due to no data for analysis. For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust (including burn pits), the $PM_{2.5}$ overall short-term health risk was not evaluated due to insufficient data for analysis. However, the JTC and vicinity area is a semi-arid dust-prone desert environment, also subject to vehicle traffic. Consequently, exposures to PM_{10} and $PM_{2.5}$ may vary, as conditions may vary, and may result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel while at this site, particularly exposures to high levels of dust such as during high winds or dust storms. For PM_{10} and $PM_{2.5}$, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio-pulmonary conditions) are at greatest risk of developing notable health effects. Burn pits were present at JTC and vicinity, and burn pits might have existed elsewhere (e.g., burn pits used by the local population); however, the PM_{10} and the $PM_{2.5}$ overall short-term health risks specifically for burn pits were not evaluated due to insufficient environmental samples collected near burn pits provided for analysis– see Section 10.7. Where burn pits exist, exposures may vary, and exposures to high levels of PM_{10} and $PM_{2.5}$ from smoke may result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel and certain subgroups. Although most short-term health effects from exposure to particulate matter and burn pit smoke should have resolved post-deployment, providers should be prepared to consider the relationship between deployment exposures and current complaints. Some individuals may have sought treatment for acute respiratory irritation while at JTC and vicinity. Personnel who reported with symptoms or required treatment while at site(s) with burn pit activity should have exposure and treatment noted in medical record (e.g., electronic medical record and/or on a SF 600 (*Chronological Record of Medical Care*).

Long-term health risks & medical implications:

The following hazards may be associated with potential chronic health effects in some personnel during deployment at JTC and vicinity:

Air quality: For $PM_{2.5}$ from environmental dust (including burn pits), the overall long-term health risk was not evaluated due to insufficient data for analysis. PM_{10} from environmental dust (including burn pits) was not evaluated for long-term health risk due to no data for analysis and no available health guidelines. However, the JTC and vicinity area is a semi-arid dust-prone desert environment, also subject to vehicle traffic, and conditions may have varied. Burn pits were present at JTC and vicinity, and burn pits might have existed elsewhere (e.g., burn pits used by the local population); however, the PM_{10} and the $PM_{2.5}$ overall long-term health risks specifically for burn pits were not evaluated due to insufficient environmental samples collected near burn pits provided for analysis– see Section 10.7. However, burn pit exposures may vary, as conditions may have varied. For inhalational exposure to high levels of dust containing PM_{10} and $PM_{2.5}$, such as during high winds or dust storms, and for exposures to burn pit smoke, it is considered possible that some otherwise healthy personnel, who were exposed for a long-term period to dust and particulate matter, could develop certain health conditions (e.g., reduced lung function, cardiopulmonary disease). Personnel with a history of asthma or cardiopulmonary disease could potentially be more likely to develop such chronic health conditions. While the dust and particulate matter exposures and exposures to burn pits are acknowledged, at this time there were no specific recommended, post-deployment medical surveillance evaluations or treatments. Providers should still consider overall individual health status (e.g., any underlying

conditions/susceptibilities) and any potential unique individual exposures (such as burn pits/barrels, incinerators, occupational or specific personal dosimeter data) when assessing individual concerns. Certain individuals may need to be followed/evaluated for specific occupational exposures/injuries (e.g., annual audiograms as part of the medical surveillance for those enrolled in the Hearing Conservation Program; and personnel covered by Respiratory Protection Program and/or Hazardous Waste/Emergency Responders Medical Surveillance).

Table 2. Population-Based Health Risk Estimates - JTC and vicinity[1, 2]

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
AIR			
$PM_{2.5}$	Short-term: Insufficient data available to assess risk. A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated.	Limiting strenuous physical activities when air quality is especially poor; and actions such as closing tent flaps, windows, and doors.	Short-term: Insufficient data available to assess risk. A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated.
	Long-term: Insufficient data available to assess risk. A small percentage of personnel may be at increased risk for developing chronic conditions, particularly those more susceptible to acute effects (e.g., those with asthma/pre-existing respiratory diseases).		Long-term: Insufficient data available to assess risk. A small percentage of personnel may be at increased risk for developing chronic conditions, particularly those more susceptible to acute effects (e.g., those with asthma/pre-existing respiratory diseases).
ENDEMIC DISEASE			
Food borne and Waterborne	Short-term: Variable. High (bacterial diarrhea) to Moderate (protozoal diarrhea and typhoid/paratyphoid fever) to Low (brucellosis and hepatitis E) to None (hepatitis A).	Preventive measures include hepatitis A and typhoid fever vaccination and consumption of food and water only from approved sources.	Short-term: Low to none.
	Long-term: None identified.		Long-term: None identified.
Arthropod Vector-Borne	Short-term: Variable. Moderate (leishmaniasis-cutaneous, rickettsioses tickborne [spotted fever group], West Nile fever, and sandfly fever) to Low (leishmaniasis-visceral, Crimean-Congo hemorrhagic fever, sindbis and sindbis-like viruses, and plague).	Preventive measures include proper wear of treated uniform, application of repellent to exposed skin, and bed net use, minimizing areas of standing water.	Short-term: Low.
	Long-term: Low (leishmaniasis-visceral infection).		Long-term: No data available.
Water-Contact	Short-term: Low (leptospirosis and schistosomiasis).	Prohibiting recreational water activities and water contact avoidance.	Short-term: Low (leptospirosis and schistosomiasis).
	Long-term: No data available.		Long-term: No data available.
Respiratory	Short-term: Low (tuberculosis and meningococcal meningitis).	Providing adequate living and work space; medical screening; vaccination.	Short-term: Low (tuberculosis and meningococcal meningitis).
	Long-term: No data available.		Long-term: No data available.

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
Animal-Contact	Short-term: Variable. Moderate (q-fever) to Low (rabies, anthrax, and H5N1 avian influenza).	Prohibiting contact with, adoption, or feeding of feral animals in accordance with CENTCOM General Order 1C. Risks are further reduced in the event of assessed contact by prompt post-exposure rabies prophylaxis in accordance with the Center for Disease Control's Advisory Committee on Immunization Practices guidance.	Short-term: No data available.
	Long-term: Low (rabies).		Long-term: No data available.
VENOMOUS ANIMALS			
Snakes, scorpions, and spiders	Short-term: Low. If exposed, effects of venom vary with species from mild localized swelling to potentially lethal effects.	Risk reduced by avoiding contact, proper wear of uniform (especially footwear), and proper and timely treatment.	Short-term: Low; If exposed, effects of venom vary with species from mild localized swelling to potentially lethal effects.
	Long-term: Not an identified source of health risk.		Long-term: Not an identified source of health risk.
HEAT/COLD INJURY			
Heat	Short-term: Variable.	Preventive measures include education and communication of heat casualty prevention information, identification of individuals who exhibit risk factors, implementation of work-rest guides, proper hydration and food intake, and use of recommended clothing	Short-term: Variable, mitigated to Low.
	Long-term: No health guidelines.		Long-term: No health guidelines.
Cold	Short-term: Low.	Preventive measures include education and communication of cold casualty prevention information, use of recommended clothing and personal protection, activity to keep warm, proper hydration and food intake, and use of adequate shelter.	Short-term: Low.
	Long-term: Low. Long-term health implications from cold injuries are rare but can occur, especially from more serious injuries such as frost bite.		Long-term: Low; Long-term health implications from cold injuries are rare but can occur, especially from more serious injuries such as frost bite.

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
Unique Incidents/ Concerns			
Burn Pits	Short-term: Burn pits were present at JTC and vicinity: however, there were insufficient sampling data available for analysis. Consequently, the PM_{10} and the $PM_{2.5}$ overall short-term health risks specifically for burn pits were not evaluated – see Section 10.7. If short-term health effects are experienced, it is anticipated that the majority of time the effects will be mild; certain elevated levels may produce eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.	Control measures may have included locating burn pits downwind of prevailing winds, increased distance from troop populations, and improved waste segregation and management techniques.	Short-term: Burn pits were present at JTC and vicinity: however, there were insufficient sample data available for analysis. Consequently, the PM_{10} and the $PM_{2.5}$ overall short-term health risks specifically for burn pits were not evaluated – see Section 10.7. If short-term health effects are experienced, it is anticipated that the majority of time the effects will be mild; certain elevated levels may produce eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.
	Long-term: Burn pits were present at JTC and vicinity; however, there were insufficient sampling data available for analysis. Consequently, the PM_{10} and the $PM_{2.5}$ overall long-term health risks specifically for burn pits were not evaluated – see Section 10.7. Exposure to burn pit smoke is variable. Exposure to high levels of PM_{10} and $PM_{2.5}$ in the smoke may be associated with some otherwise healthy personnel, who were exposed for a long-term period, possibly developing certain health conditions (e.g., reduced lung function, cardiopulmonary disease). Personnel with a history of asthma or cardiopulmonary disease could potentially be more likely to develop such chronic health conditions.		Long-term: Burn pits were present at JTC and vicinity; however, there were insufficient sampling data available for analysis. Consequently, the PM_{10} and the $PM_{2.5}$ overall long-term health risks specifically for burn pits were not evaluated – see Section 10.7. Exposure to burn pit smoke is variable. Exposure to high levels of PM_{10} and $PM_{2.5}$ in the smoke may be associated with some otherwise healthy personnel, who were exposed for a long-term period, possibly developing certain health conditions (e.g., reduced lung function, cardiopulmonary disease). Personnel with a history of asthma or cardiopulmonary disease could potentially be more likely to develop such chronic health conditions.

[1]This Summary Table provides a qualitative estimate of population-based short- and long-term health risks associated with the occupational and environmental health conditions at JTC and vicinity. It does not represent an individual exposure profile. Actual individual exposures and health effects depend on many variables. For example, while a chemical may have been present in the environment, if a person did not inhale, ingest, or contact a specific dose of the chemical for adequate duration and frequency, then there may have been no health risk. Alternatively, a person at a specific location may have experienced a unique exposure which could result in a significant individual exposure. Any such person seeking medical care should have their specific exposure documented in an SF 600.

[2] This assessment is based on specific environmental sampling data and reports obtained from 7 April 2011 through 31 December 2015. Sampling locations are assumed to be representative of exposure points for the camp population but may not reflect all the fluctuations in environmental quality or capture unique exposure incidents.

[3]This Summary Table is organized by major categories of identified sources of health risk. It only lists those sub-categories specifically identified and addressed at JTC and vicinity. The health risks are presented as Low, Moderate, High or Extremely High for both acute and chronic health effects. The health risk level is based on an assessment of both the potential severity of the health effects that could be caused and probability of the exposure that would produce such health effects. Details can be obtained from the Army Public Health Center (Provisional). Where applicable, "None Identified" is used when though a potential exposure is identified, and no health risks of either a specific acute or chronic health effects are determined. More detailed descriptions of OEH exposures that are evaluated but determined to pose no health risk are discussed in the following sections of this report.

[4]Health risks in this Summary Table are based on quantitative surveillance thresholds (e.g., endemic disease rates; host/vector/pathogen surveillance) or screening levels, e.g., Military Exposure Guidelines (MEGs) for chemicals. Some previous assessment reports may provide slightly inconsistent health risk estimates because quantitative criteria such as MEGs may have changed since the samples were originally evaluated and/or because this assessment makes use of all historic site data while previous reports may have only been based on a select few samples.

1 Discussion of Health Risks at JTC and vicinity, Jordan by Source

The following sections provide additional information about the OEH conditions summarized above. All risk assessments were performed using the methodology described in the U.S. Army Public Health Command (USAPHC) Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (Reference 4). All OEH risk estimates represent residual risk after accounting for preventive controls in place. Occupational exposures and exposures to endemic diseases are greatly reduced by preventive measures. For environmental exposures related to airborne dust, there are limited preventive measures available, and available measures have little efficacy in reducing exposure to ambient conditions.

The ProUCL version 5.0 software package was used for statistical analyses (Reference 5). Means are followed by standard deviation. Risk characterization was based on the 95 percent upper confidence level of the arithmetic mean (95% UCL) or the arithmetic mean depending on the quality and quantity of the data being evaluated. The sample mean is an uncertain estimate of the true mean of the population exposure point concentration (PEPC). The 95% UCL reduces the uncertainty inherent in the sample mean and states with a higher level of confidence that the mean PEPC is no greater than the 95% UCL.

2 Air

2.1 Site-Specific Sources Identified

JTC and vicinity is situated in a dusty semi-arid desert environment. Inhalational exposure to high levels of dust and particulate matter, such as during high winds or dust storms, may result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel. Additionally, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio pulmonary conditions) are at greatest risk of developing notable health effects.

All personnel were assumed to be exposed to emissions from burn pits and incinerators located in the vicinity of JTC. Therefore, air samples associated with a burn pit or incinerator at JTC and vicinity were included in the following assessment of the air at JTC and vicinity.

2.2 Particulate matter

Particulate matter (PM) is a complex mixture of extremely small particles suspended in the air. The PM includes solid particles and liquid droplets emitted directly into the air by sources such as: power plants, motor vehicles, aircraft, generators, construction activities, fires, and natural windblown dust. The PM can include sand, soil, metals, volatile organic compounds, allergens, and other compounds such as nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. The PM composition and particle size vary considerably depending on the source. Generally, PM of health concern is divided into two fractions: PM_{10} and $PM_{2.5}$, which can reach the deepest regions of the lungs when inhaled. Only $PM_{2.5}$ samples were collected at JTC. Exposure to excessive PM is linked to a variety of potential health effects.

2.3 $PM_{2.5}$

2.3.1 Exposure Guidelines:

Short Term (24-hour) $PM_{2.5}$ ($\mu g/m^3$):

- Negligible MEG = 65

Long-term (1-year) $PM_{2.5}$ MEGs ($\mu g/m^3$):

- Negligible MEG = 15

- Marginal MEG = 250
- Critical MEG = 500
- Marginal MEG = 65.

2.3.2 Sample data/Notes:

A total of 11 valid $PM_{2.5}$ air samples were collected from 2013 to 2015, no samples were taken prior to 2013. The range of 24-hour $PM_{2.5}$ concentrations was 8 µg/m^3 to 52 µg/m^3 with an average concentration of 31 µg/m^3 and a standard deviation of 18.

2.3.3 Short-term health risks:

There was insufficient data with which to characterize short-term health risk from exposure to $PM_{2.5}$ in air. Daily average health risk levels for $PM_{2.5}$ show no hazard for 100 percent of the time. Confidence in the short-term $PM_{2.5}$ health risk assessment was Low (Reference 4, Table 3-6).

2.3.4 Long-term health risks:

There was insufficient data with which to characterize long-term health risk from exposure to $PM_{2.5}$ in air.

2.4 Airborne Metals

2.4.1 Airborne Metals from $PM_{2.5}$

2.4.1.1 Sample data/Notes:

A total of 10 valid $PM_{2.5}$ airborne metal samples were collected at JTC and vicinity from 2013 to 2015. None of the analyzed metals in the collected samples were found at concentrations above the 1-year Negligible MEGs.

2.4.1.2 Short-term and long-term health risks:

There was insufficient data with which to characterize short-term and long-term health risk from exposure to airborne metals in $PM_{2.5}$ in air.

3 Soil

3.1 Site-Specific Sources Identified

3.2 Sample data/Notes:

A total of five valid surface soil samples were collected from 2012 to 2013 to assess OEH health risk to deployed personnel. The primary soil contamination exposure pathways are dermal contact and dust inhalation. Typical parameters analyzed for included semi volatile organic compounds, heavy metals, polychlorinated biphenyls, pesticides, herbicides. If the contaminant was known or suspected, other parameters may have been analyzed for (i.e., total petroleum hydrocarbons and polycyclic aromatic hydrocarbons near fuel spills). For the risk assessment, personnel are assumed to have remained at this location for six months to one year.

3.3 Short-term health risk:

Not an identified source of health risk. Currently, sampling data for soil are not evaluated for short term (acute) health risks**.**

3.4 Long-term health risk:

None identified based on available sample data. No parameters exceeded 1-year Negligible MEGs for dermal contact. The dust inhalation exposure pathway is addressed in Section 2 above.

4 Water

In order to assess the health risk to U.S. personnel from exposure to water in theater, the Army Public Health Center (Provisional) identified the most probable exposure pathways. These are based on the administrative information provided on the field data sheets submitted with the samples taken over the time period being evaluated. It is assumed that 100 percent of all U.S. personnel at JTC and vicinity were directly exposed to reverse osmosis water purification unit (ROWPU) treated and disinfected fresh bulk water, since this classification of water is primarily used for personal hygiene, showering, cooking, and for use at vehicle wash racks. There is a possibility that personnel, particularly at small outlying camps, may have used water that was not regularly disinfected for showering, personal hygiene, or cleaning. Field data sheets indicate that bottled water is the only approved source of drinking water; however, in instances where bottled water was unavailable, other water sources were used.

4.1 Non-Drinking Water

4.1.1 Site-Specific Sources Identified

Although the primary route of exposure for most microorganisms is ingestion of contaminated water, dermal exposure to some microorganisms, chemicals, and biologicals may also cause adverse health effects. Complete exposure pathways would include brushing teeth, personal hygiene, washing dishes, cooking, providing medical and dental care using a contaminated water supply, or during dermal contact at vehicle or aircraft wash racks.

4.1.2 Sample data/Notes:

To assess the potential for adverse health effects to troops the following assumptions were made about dose and duration: All U.S. personnel at this location were expected to remain at this site for approximately one year. A conservative (protective) assumption is that personnel were exposed to less than 5 L/day of non-drinking water for up to 365 days. It is further assumed that control measures and/or personal protective equipment were not used. A total of eight non-drinking water samples from 2011 to 2015 were evaluated for this health risk assessment. None of the analyzed parameters in the collected samples were found at concentrations above the 1-year Negligible 5 L/d Negligible MEG.

4.1.3 Short-term and long-term health risks:

There was insufficient data with which to characterize short-term and long-term health risk from exposure to chemicals in non-drinking water.

5 Military Unique

5.1 Chemical Biological, Radiological Nuclear Weapons

No specific hazard sources were documented in the Defense Occupational and Environmental Health Readiness System (DOEHRS), or the Military Exposure Surveillance Library (MESL) from 7 April 2011 through 31 December 2015 timeframe (References 1 and 6).

5.2 Depleted Uranium

No specific hazard sources were documented in the DOEHRS, or MESL from 7 April 2011 through 31 December 2015 timeframe (References 1 and 6).

5.3 Ionizing Radiation

No specific hazard sources were documented in the DOEHRS, or MESL from 7 April 2011 through 31 December 2015 timeframe (References 1 and 6).

5.4 Non-Ionizing Radiation

No specific hazard sources were documented in the DOEHRS, or MESL from 7 April 2011 through 31 December 2015 timeframe (References 1 and 6).

6 Endemic Diseases

This document lists the endemic diseases reported in the region, its specific health risks and severity and general health information about the diseases. U.S. CENTCOM Modification 12 (Reference 7) lists deployment requirements, to include immunizations and chemoprophylaxis, in effect during the timeframe of this POEMS.

6.1 Food borne and Waterborne Diseases

Food borne and waterborne diseases in the area are transmitted through the consumption of local food and water. Sanitation varied with location but typically was below U.S. standards. Local food and water sources (including ice) may have been contaminated with pathogenic bacteria, parasites, and viruses to which most U.S. Service Members had little or no natural immunity. In addition, although not specifically assessed in this document, significant outbreaks of viral gastroenteritis and food poisoning may have occurred. Mitigation strategies include consuming food and water from approved sources, vaccinations, frequent hand washing, and general sanitation practices.

6.1.1 Diarrheal diseases (bacteriological)

High, mitigated to Low: An operationally significant attack rate (potentially 11-50 percent per month) could have occurred among personnel consuming local food, water, or ice. Field conditions (including lack of hand washing and primitive sanitation) may have facilitated person-to-person spread and epidemics. Typically, it is treated in an outpatient setting with recovery and return to duty in less than 72 hours with appropriate therapy. A small proportion of infections may have required greater than 72 hours limited duty, or hospitalization.

6.1.2 Hepatitis A

None: Rare cases (less than 0.1 percent per month attack rate) could have occurred among unvaccinated personnel consuming local food, water, or ice. However, vaccination for hepatitis A is required for deployment into the CENTCOM Area of Responsibility.

6.1.3 Diarrheal diseases (protozoal)

Moderate, mitigated to Low: A small number of cases (less than one percent per month attack rate) could have occurred among personnel consuming local food, water, or ice. Outbreaks affecting a higher percentage of personnel were possible with *Cryptosporidium*. Symptomatic cases may have varied in severity. Typically, it is a mild disease demonstrating recovery and return to duty in less than 72 hours with appropriate therapy; severe cases may have required one to seven days of supportive care, followed by return to duty.

6.1.4 Typhoid/paratyphoid fever

Moderate, mitigated to Low: Rare cases (less than 0.1 percent per month attack rate) could have occurred among unvaccinated personnel consuming local food, water, or ice. Common source outbreaks may have occurred. With appropriate treatment, typhoid and paratyphoid fever are debilitating febrile illnesses typically requiring one to seven days of supportive care, followed by return to duty. Risk is elevated during warmer months and in populated areas with poor sanitation. Asymptomatic carriers are common with typhoid and contribute to sustained transmission.

6.1.5 Brucellosis

Low: Extremely rare cases (less than 0.01 percent per month attack rate) could have occurred. Humans contract brucellosis through consumption of contaminated dairy products (or foods made with such products) or by occupational exposures to infected animals. Brucellosis is a febrile illness of variable severity, potentially requiring inpatient care. Convalescence is usually over seven days even with appropriate treatment.

6.1.6 Hepatitis E

Low: Extremely rare cases (less than 0.01 percent per month attack rate) could have occurred. Typical cases involve one to three weeks of debilitating symptoms, sometimes initially requiring inpatient care. Recovery and return to duty may require a month or more.

6.1.3 Short-term Health Risks:

Variable, unmitigated; Low, mitigated: The overall unmitigated short-term risk associated with food borne and waterborne diseases ranged from High (bacterial diarrhea) to Moderate (protozoal diarrhea and typhoid/paratyphoid fever) to Low (brucellosis and hepatitis E) to None (hepatitis A) if local food or water was consumed. Preventive medicine measures reduce the risk to Low. Confidence in the health risk estimate is High.

6.1.4 Long-term Health Risks:

None identified based on available data.

6.2 Arthropod Vector-Borne Diseases

During the warmer months (typically April through October), ecological conditions countrywide support arthropod vectors, including mosquitoes, ticks, and sand flies, with variable rates of disease transmission. A wide variety of vector-borne diseases occur at low or unknown levels. Individually, most of these diseases were likely to affect only a small percentage of personnel. However, the combined risk was higher, and many diseases have the potential to cause prolonged illness and, in some cases, death. Mitigation strategies include proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets and chemoprophylaxis (when applicable). Additional methods included the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.1 Leishmaniasis-cutaneous

Moderate, mitigated to Low: A small number of cases (less than one percent per month attack rate) could have occurred among personnel exposed to sandfly bites in areas with infected people, rodents, dogs, or other reservoir animals. In groups of personnel exposed to heavily infected sandflies in focal areas, attack rates can be very high (over 50 percent). Cutaneous infection is unlikely to be debilitating, though lesions can be disfiguring. Definitive treatment previously required non-urgent evacuation to the continental U.S. however not all cases require evacuation.

6.2.2 Leishmaniasis-visceral

Low: Disease was assessed as present; rare cases (less than 0.1 percent per month) cannot be ruled out among personnel exposed to sandfly bites in areas with infected humans, dogs, or other reservoir animals. Asymptomatic chronic infections may occur which may become symptomatic years later. When symptomatic, visceral leishmaniasis causes a severe febrile illness which typically requires hospitalization with convalescence over seven days. Chronic asymptomatic infections may occur, which can become symptomatic years after exposure if the immune system is compromised by chronic illnesses, human immunodeficiency virus, or other factors.

6.2.3 Crimean-Congo hemorrhagic fever

Low: Crimean-Congo hemorrhagic fever was present and rare cases (less than 0.1 percent per month) cannot be ruled out among personnel exposed to tick bites. Direct contact with blood and body fluids of an infected animal or person may also transmit infection. It is a very severe illness typically requiring intensive care with fatality rates from five to 50 percent.

6.2.4 Sandfly fever

Moderate, mitigated to Low: Sporadic cases could have occurred most of the time. However, conditions may have supported unpredictable and explosive increases in transmission. During peak transmission, operationally significant attack rates (potentially one to 10 percent per month) could have occurred among personnel exposed to sandfly bites. In small groups exposed to heavily infected sandfly populations in focal areas, attack rates could have been very high (potentially up to 50 percent). Debilitating febrile illness typically requires one to seven days of supportive care followed by return to duty.

6.2.5 Sindbis (and Sindbis-like viruses)

Low: Sindbis and sindbis-like viruses were assessed as present. Rare cases (less than 0.1 percent per month) could not be ruled out among personnel exposed to mosquito bites. Debilitating febrile

illness is often accompanied by rash, typically requiring one to seven days of supportive care. Significant arthralgias could have persisted for several weeks or more in some cases.

6.2.6 Rickettsioses, tickborne (spotted fever group)

Moderate, mitigated to Low: Rickettsioses were present. Though data were insufficient to assess potential disease rates, up to one percent of personnel exposed to tick bites could have been affected per month under worst-case conditions. Rickettsioses are typically debilitating febrile illnesses requiring one to seven days of supportive care, followed by a return to duty. More prolonged and severe infections may have occurred with rare fatalities. Fatality rates in untreated cases could be higher.

6.2.7 West Nile fever

Moderate, mitigated to Low: West Nile fever was present but levels were unknown. Data were insufficient to assess potential disease rates. However, a small number of cases (less than one percent per month attack rate) could have occurred among personnel exposed to mosquito bites. West Nile fever is a febrile illness typically requiring one to seven days of inpatient care, followed by a return to duty

6.2.8 Plague

Low: The plague was assessed as present and rare cases (less than 0.1 percent per month) could not be ruled out among personnel exposed to rodents and flea bites. Epidemic transmission was unlikely, but may have occurred under conditions of crowding, with heavy flea exposure and respiratory transmission. Plague is a potentially severe illness which may require more than seven days of hospitalization and convalescence.

6.2.9 Short-term health risks:

Variable, unmitigated; Low, mitigated: The overall unmitigated short-term risk associated with arthropod vector-borne diseases ranged from Moderate (leishmaniasis-cutaneous, rickettsioses tickborne [spotted fever group], West Nile fever, and sandfly fever) to Low (leishmaniasis-visceral, Crimean-Congo hemorrhagic fever, sindbis and sindbis-like viruses, and plague). Risk was reduced to Low by preventive medicine measures, proper wear of the uniform, and application of repellent to exposed skin. Confidence in the risk estimate is High.

6.2.10 Long-term health risks:

Low: The unmitigated risk was Low for leishmaniasis-visceral (chronic). Risk was reduced by preventive medicine measures, proper wear of the uniform, and application of repellent to exposed skin. Confidence in the risk estimate is High.

6.3 Water-Contact Diseases

Operations or activities that involved extensive water contact may have resulted in personnel being temporarily debilitated with leptospirosis and schistosomiasis in some locations. Bodies of surface water were likely to be contaminated with human and animal waste. Activities such as wading or swimming may have resulted in exposures to enteric diseases such as diarrhea and hepatitis via incidental ingestion of water. Prolonged water contact may have also lead to the development of a variety of potentially debilitating skin conditions such as bacterial or fungal dermatitis. Mitigation strategies include avoiding water contact and recreational water activities, proper wear of uniform

(especially footwear), and protective coverings for cuts or abraded skin.

6.3.1 Leptospirosis

Low, mitigated to Low: Although data were insufficient to assess potential disease rates, up to one percent to 10 percent of personnel wading or swimming in bodies of water such as lakes, streams, or irrigated fields could have been affected per month. In groups with prolonged exposure to heavily contaminated foci, attack rates could have been up to 50 percent. Debilitating febrile illness typically requires one to seven days of inpatient care, followed by a return to duty. Some cases may have required prolonged convalescence.

6.3.2 Schistosomiasis

Low, mitigated to Low: A small number of cases (less than one percent per month attack rate) could have occurred among personnel wading or swimming in fecally contaminated bodies of water such as lakes, streams, or irrigated fields. In groups with prolonged exposure to heavily contaminated foci, attack rates could have exceeded 10 percent. Mild infections are generally asymptomatic. In very heavy acute infections, a febrile illness (acute schistosomiasis) may have occurred requiring hospitalization and convalescence over seven days.

6.3.3 Short-term health risks:

Moderate, unmitigated; Low, mitigated: The overall unmitigated short-term risk associated with water contact diseases were Moderate. Risk was reduced to Low by preventive medicine measures. Confidence in the risk estimate is High.

6.3.4 Long-term health risks:

None identified based on available data.

6.4 Respiratory Diseases

Deployed U.S. Forces may have been exposed to a wide variety of common respiratory infections in the local population. These may have included influenza, pertussis, viral upper respiratory infections, viral and bacterial pneumonia, and others. U.S. military populations living in close-quarter conditions were at risk for substantial person-to-person spread of respiratory pathogens. Influenza is of particular concern because of its ability to debilitate large numbers of unvaccinated personnel for several days. Mitigation strategies include routine medical screenings, vaccination, enforcing minimum space allocation in housing units, implementing head-to-toe sleeping in crowded housing units, implementation of proper PPE when necessary for healthcare providers and detention facility personnel.

6.4.1 Tuberculosis

Low: The risk of tuberculosis in U.S. Forces varied with individual exposure. Infection typically requires prolonged indoor exposure to local populations with high tuberculosis incidence rates. Individuals with prolonged indoor exposure to the local population in countries with an incidence at or above 25 per 100,000 were at increased risk for latent tuberculosis infection. The Army Surgeon General defined increased risk in deployed Soldiers as indoor exposure to locals or third country nationals of greater than one hour per week in a highly endemic active tuberculosis region. Mitigation strategies include routine medical screenings, enforcing minimum space allocation in housing units, implementing head-to-toe sleeping in crowded housing units, and implementation of proper PPE, when

necessary (treating active case, detainee operations). Additional mitigation includes active case isolation in negative pressure rooms, where available.

6.4.2 Meningococcal meningitis

Low: Meningococcal meningitis risk was Low among unvaccinated personnel who have close contact with the local population. Meningococcal meningitis is a potentially a very severe disease typically requiring intensive care; fatalities may occur in five to 15 percent of cases.

6.4.3 Short-term health risks:

Low: The overall short-term risk associated with respiratory diseases was Low. Confidence in the risk estimate is High.

6.4.4 Long-term health risks:

None identified based on available data. Tuberculosis is evaluated as part of the post deployment health assessment. A tuberculosis skin test is required post-deployment if potentially exposed and is based upon individual service policies.

6.5 Animal-Contact Diseases

6.5.1 Rabies

Low: Rabies risk was assessed as roughly comparable to rabies risk in the U.S.; however, personnel bitten by potentially infected reservoir species may develop rabies in the absence of appropriate prophylaxis. Rabies causes very severe illness with near 100 percent fatality rate in the absence of post-exposure prophylaxis. According to the Jordan Ministry of Health, between 1997 and 2011, no human rabies cases were reported despite hundreds of reported animal bites; the number of post-exposure prophylaxes given is unknown. One case of rabies was reported in 2012 and one in 2014. No cases of rabies acquired in Jordan have been identified in U.S. Service Members to date. The vast majority (greater than 99 percent) of persons who develop rabies disease will do so within a year after a risk exposure, there have been rare reports of individuals presenting with rabies disease up to six years or more after their last known risk exposure. Mitigation strategies include command prohibition on feeding or watering stray or domestic animals and making pets of stray animals, reduction of animal habitats, active pest management programs, and timely treatment of feral animal scratches and bites.

6.5.2 Anthrax

Low: Rare cases (less than 0.1 percent per month attack rate) could have occurred among personnel with occupational-type exposure to livestock or wild herbivores, or hides or wool products from these species, as well as handling or consumption of undercooked meat. In the absence of such exposures, risk is essentially zero. Cutaneous and gastrointestinal anthrax are the most common forms of naturally occurring anthrax. The risk of naturally acquired inhalation (pulmonary) anthrax is remote. Cutaneous anthrax typically requires one to seven days of supportive care with subsequent return to duty. Gastrointestinal anthrax typically requires hospitalization and has a high fatality rate if untreated. Inhalation anthrax is very severe, often requiring intensive care and fatalities may occur even in treated cases. Mitigation measures include consuming approved food sources, proper food preparation and cooking temperatures, avoidance of animals and farms, dust abatement when working in these areas, vaccinations, and proper PPE for personnel working with animals.

6.5.3 Q-Fever

Moderate, mitigated to Low: Q-fever was assessed as present. Rare cases (less than 0.1 percent per month) could not be ruled out among personnel exposed to aerosols from potentially infected animals, with clusters of cases possible in some situations. Significant outbreaks (affecting one to 50 percent) could have occurred in personnel with heavy exposure to barnyards or other areas where animals were kept. Unpasteurized milk may also have transmitted infection. Debilitating febrile illness, sometimes presented as pneumonia, typically require one to seven days of inpatient care followed by a return to duty.

6.5.4 H5N1 avian influenza

Low: Extremely rare cases (less than 0.01 percent per month attack rate) could have occurred. Very severe illness could have occurred with fatality rates higher than 50 percent in symptomatic cases. Although H5N1 avian influenza is easily transmitted among birds, bird-to-human transmission is extremely inefficient. Human infections have occurred on a very rare basis and have been associated with activities involving close, direct contact with infected poultry, such as plucking, slaughter, or other handling. There is no risk from consumption of properly cooked poultry products. Mitigation strategies include avoidance of birds/poultry and proper cooking temperatures for poultry products.

6.5.5 Short-term health risks:

Variable, unmitigated; Low, mitigated: The overall unmitigated short-term risk associated with animal-contact diseases ranged from Moderate (q-fever) to Low (rabies, anthrax, and H5N1 avian influenza). Risk was reduced to Low by preventive medicine measures. Confidence in the risk estimate is High.

6.5.6 Long-term health risks:

Low: A Low long term risk exists for rabies because, in rare cases, the incubation period for rabies can be several years.

7 Venomous Animals

The species listed below are medically relevant, have home ranges that overlap the location of JTC and vicinity, and could have presented a short-term health risk if personnel were exposed to the venom (References 8, 9, and 10).

7.1 Spiders

- *Latrodectus tredecimguttatus* and *Loxosceles rufescens*: Severe envenoming is possible. Bites are potentially lethal but unlikely.

- *Latrodectus pallidus*: Clinical effects are uncertain but *Latrodectus pallidus* is related to medically important species of spiders, therefore major envenoming cannot be excluded.

7.2 Scorpions

- *Androctonus amoreuxi*, *Androctonus crassicauda*, *Leiurus quinquestriatus*, and *Nebo hierichonticus*: Severe envenoming is possible. Stings are potentially lethal.

- *Hottentotta judaicus*: Moderate envenoming is possible but stings are unlikely to prove lethal.

7.3 Snakes

- *Atractaspis engaddensis*, *Daboia palaestinae*, *Macrovipera lebetina*, and *Echis coloratus*: Severe envenoming is possible. Bites are potentially lethal.

- *Cerastes gasperettii* and *Walterinnesia aegyptia*: Unknown. Potentially lethal envenoming is unlikely but cannot be excluded.

- *Pseudocerastes persicus fieldi*: Unknown. Bites are unlikely to cause significant envenoming.

7.4 Short-term health risk:

Low. If exposed, effects of venom vary with species from localized swelling and pain to potentially lethal effects. Mitigation strategies included avoiding contact, proper wear of uniform (especially footwear), timely medical treatment, and use of pesticides. Confidence in the health risk estimate is Low (Reference 4, Table 3-6).

7.5 Long-term health risk:

None identified. Exposure to venom from animals potentially encountered at JTC and vicinity does not cause long-term health effects.

8 Heat/Cold Injury

8.1 Heat Injury

Risk of an individual suffering a heat illness is not determined by a single threshold value. Instead a variety of risk factors, including environmental conditions, clothing, and activity level are examined on a daily basis to determine the degree of heat stress risk to units. Risk factors that influence heat illness risk include the wet bulb globe temperature category, previous daily wet bulb globe temperature categories, previous and projected daily workload and level of exertion, days of heat acclimatization, amount of quality sleep, level of fitness and health, use medications, supplements, dietary aids, alcohol, previous instances of heat illness, and age.

Ambient daily high temperatures at JTC and vicinity historically exceed 75 degrees Fahrenheit (°F) from April to October, indicating that heat stress hazards should have been assessed and a risk matrix should have been employed daily to determine the degree of heat illness risk.

Once risk levels from heat stress are determined, preventive measures can be implemented to mitigate heat illness casualties. Preventive measures for heat illness casualties include education and communication of heat casualty prevention information, identification of individuals who exhibit risk factors, implementation of work-rest guides, proper hydration and food intake, and use of recommended clothing (Reference 11).

8.1.1 Short-term health risk:

Variable, mitigated to Low. Heat illness risk factors across the population at JTC and vicinity were assessed to determine the heat illness risk level to units. The variety of risk factors resulted in variable risk of heat stress across the population. The risk of heat illness was reduced to Low through implementation of preventive measures. Confidence in the health risk estimate is Low (Reference 4, Table 3-6).

8.1.2 Long-term health risk:

Unknown. Long-term health effects from exposure to high levels of heat stress are not adequately documented and available data appears inconclusive (Reference 12).

8.2 Cold Stress

As with heat stress, cold stress is largely dependent on operational and individual factors instead of environmental factors alone. Cold stress can be assessed by determining the air temperature, wind speed, if an individual becomes wet due to precipitation or water immersion, use of proper gear, availability of adequate shelter, proper fitness, proper food and hydration, degree of mobility, and contact with conductive cooling surfaces (Reference 13).

Ambient daily low temperatures at JTC and vicinity historically are below 60°F from January to December, indicating that wetness or wet clothes may have presented a hazard of non-cold freezing injuries, and below 40°F from December to March, indicating that cold stress may have presented a hazard.

Preventive measures were implemented to mitigate cold injury casualties. Preventive measures for non-cold freezing injuries and cold illness include education and communication of cold casualty prevention information, use of recommended clothing and personal protection, activity to keep warm, proper hydration and food intake, and use of adequate shelter.

8.2.1 Short-term and long-term health risks:

Low. The health risk of cold injury is Low. Confidence in the health risk estimate is Medium (Reference 4, Table 3-6).

9 Noise

9.1 Continuous

No specific hazard sources were documented in the DOEHRS or MESL from the 7 April 2011 through 31 December 2015 timeframe.

9.1.1 Short-term health risks:

Not evaluated.

9.1.2 Long-term health risks:

Not evaluated.

9.2 Impulse

No specific hazard sources were documented in the DOEHRS or MESL from the 7 April 2011 through 31 December 2015 timeframe.

9.2.1 Short-term health risks:

Not evaluated.

9.2.2 Long-term health risks:

Not evaluated.

10 Unique Incidents/Concerns

10.1 Potential environmental contamination sources

DoD personnel are exposed to various chemical, physical, ergonomic, and biological hazards in the course of performing their mission. These types of hazards depend on the mission of the unit and the operations and tasks which the personnel are required to perform to complete their mission. The health risk associated with these hazards depends on a number of elements including what materials are used, how long the exposure last, what is done to the material, the environment where the task or operation is performed, and what controls are used. The hazards can include exposures to heavy metal particulates (e.g., lead, cadmium, manganese, chromium, and iron oxide), solvents, fuels, oils, and gases (e.g., carbon monoxide, carbon dioxide, oxides of nitrogen, and oxides of sulfur). Most of these exposures occur when performing maintenance task such as painting, grinding, welding, engine repair, or movement through contaminated areas. Exposures to these occupational hazards can occur through inhalation (air), skin contact, or ingestion; however, exposures through air are generally associated with the highest health risk.

10.2 Waste Sites/Waste Disposal

No specific hazard sources were documented in the DOEHRS or MESL from the 7 April 2011 through 31 December 2015 timeframe.

10.3 Fuel/petroleum products/industrial chemical spills

No specific hazard sources were documented in the DOEHRS or MESL from the 7 April 2011 through 31 December 2015 timeframe.

10.4 Pesticides/Pest Control:

No specific hazard sources were documented in the DOEHRS or MESL from the 7 April 2011 through 31 December 2015 timeframe.

10.5 Asbestos

No specific hazard sources were documented in the DOEHRS or MESL from the 7 April 2011 through 31 December 2015 timeframe.

10.6 Lead Based Paint

No specific hazard sources were documented in the DOEHRS or MESL from the 7 April 2011 through 31 December 2015 timeframe.

10.7 Burn Pit

While not specific to JTC and vicinity, the consolidated epidemiological and environmental sampling and studies on burn pits that have been conducted as of the date of this publication have been unable to determine whether an association does or does not exist between exposures to emissions from the burn pits and long-term health effects (Reference 14). The Institute of Medicine committee's

(Reference 14) review of long-term health consequences of exposure to burn pits in Iraq and Afghanistan suggests that service in Jordan (i.e., a broader consideration of air pollution than exposure only to burn pit emissions) may be associated with long-term health effects, particularly in susceptible (e.g., those who have asthma) or highly exposed subpopulations, such as those who worked at or near the burn pit. Such health effects would be due mainly to high ambient concentrations of PM from both natural and anthropogenic sources, including military sources. If that broader exposure to air pollution turns out to be relevant, potentially related health effects of concern are respiratory and cardiovascular effects and cancer. Susceptibility to the PM health effects could be exacerbated by other exposures, such as stress, smoking, local climatic conditions, and co-exposures to other chemicals that affect the same biologic or chemical processes. Individually, the chemicals measured at burn pit sites in the study were generally below concentrations of health concern for general populations in the U.S. However, the possibility of exposure to mixtures of the chemicals raises the potential for health outcomes associated with cumulative exposure to combinations of the constituents of burn pit emissions and emissions from other sources.

To characterize risk to personnel who were specifically exposed to emissions from burn pits and incinerators located in the vicinity of JTC, only air samples associated with a burn pit or incinerator at JTC and vicinity were included in the following assessment of the air at JTC and vicinity.

10.7.1 $PM_{2.5}$ Samples Associated with Exposure to Burn Pit Emissions

10.7.1.1 Exposure Guidelines

Short Term (24-hour) $PM_{2.5}$ ($\mu g/m^3$):
- Negligible MEG = 65
- Marginal MEG = 250
- Critical MEG = 500

Long-term $PM_{2.5}$ MEG ($\mu g/m^3$):
- Negligible MEG = 15
- Marginal MEG = 65

10.7.1.2 Sample data/Notes:

A total of five valid $PM_{2.5}$ air samples identified with burn pits were collected at JTC and vicinity in 2013. The range of 24-hour $PM_{2.5}$ concentrations was 10 $\mu g/m^3$ to 27 $\mu g/m^3$ with an average concentration of 21 $\mu g/m^3$ and a standard deviation of 9.

10.7.1.3 Short-term health risks:

There was insufficient data with which to characterize short-term health risk from exposure to $PM_{2.5}$ in air in the vicinity of the burn pit. Daily average health risk levels for $PM_{2.5}$ show no hazard for 100 percent of the time. Confidence in the short-term $PM_{2.5}$ health risk assessment was Low (Reference 4, Table 3-6).

10.7.1.4 Long-term health risks:

There was insufficient data with which to characterize long-term health risk from exposure to $PM_{2.5}$ in air in the vicinity of the burn pit.

10.7.2 Airborne Metal from $PM_{2.5}$ Samples Associated with Exposure to Burn Pit Emissions or incinerators

10.7.2.1 Sample data/Notes:

A total of five valid $PM_{2.5}$ airborne metal samples identified with burn pits were collected at JTC and vicinity in 2013. None of the analyzed metals in the collected samples were found at concentrations above the 1-year Negligible MEGs.

10.7.2.2 Short-term and long-term health risks:

There was insufficient data with which to characterize short-term and long-term health risk from exposure to airborne metals in $PM_{2.5}$ in air in the vicinity of the burn pit.

11 References

1. Defense Occupational and Environmental Health Readiness System (referred to as the DOEHRS-EH Module) at https://doehrs-ih.csd.disa.mil/Doehrs/. Department of Defense Instruction 6490.03, *Deployment Health*, 2006.

2. Department of Defense Instruction 6055.05, Occupational and Environmental Health, 2008.

3. Joint Chiefs of Staff. Procedures for Deployment Health Surveillance, MCM 0017-12, 7 December 2012.

4. USAPHC Technical Guide 230, June 2013 Revision.

5. Singh, A. and Singh, A.K. 2013. ProUCL Version 5.0.00 Technical Guide-Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. EPA: Washington, WA, USA.

6. DoD MESL Data Portal: https://mesl.apgea.army.mil/mesl/. Some of the data and reports used may be classified or otherwise have some restricted distribution.

7. Modification 12 to United States Central Command Individual Protection and Individual Unit Deployment Policy, 02 December 2013.

8. Clinical Toxinology Resources: http://www.toxinology.com/. University of Adelaide, Australia.

9. Amr, Z, Disi, A. Venomous Snakes and Snakebites in Jordan. Clinical Toxinology in Asia Pacific and Africa. 2015.

10. Amr, Z, Amr, S. Snakebites in Jordan. The Snake. 1983.

11. Technical Bulletin Medical 507. Heat Stress Control and Heat Casualty Management. Headquarters, Department of the Army and Air Force. 7 March 2003.

12. American Conference of Governmental Industrial Hygienists. Heat Stress and Strain: TLV Physical Agents. 2007.

13. Technical Bulletin Medical 508. Prevention and Management of Cold-Weather Injuries. Headquarters, Department of the Army. April 2005.

14. Institute of Medicine. 2011. Long-term health consequences of exposure to burn pits in Iraq and Afghanistan. Washington, DC: The National Academies Press.

12 Where Do I Get More Information?

If a provider feels that the Service member's or Veteran's current medical condition may be attributed to specific OEH exposures at this deployment location, he/she can contact the Service-specific organization below. Organizations external to DoD should contact Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O).
Army Public Health Center Phone: (800) 222-9698. http://phc.amedd.army.mil/
Navy and Marine Corps Public Health Center (NMCPHC) (formerly NEHC) Phone: (757) 953-0700. http://www.med.navy.mil/sites/nmcphc/Pages/Home.aspx
U.S. Air Force School of Aerospace Medicine (USAFSAM) (formerly AFIOH) Phone: (888) 232-3764. http://www.wpafb.af.mil/afrl/711hpw/usafsam/
DoD, Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O) Phone: (800) 497-6261. http://fhpr.dhhq.health.mil/home.aspx